

Volunteer Monitors Really Do Make A Difference: The Pine River Pond Investigation

by Andrea LaMoreaux, DES VLAP Coordinator

Do VLAP monitors really make a difference? That is a common question we get here at the Department of Environmental Services (DES) from lake associations and individuals considering joining the Volunteer Lake Assessment Program (VLAP). The answer is a definite "YES!" Just ask the VLAP volunteer monitors from Pine River Pond in Wakefield. Routine VLAP monitoring at Pine River Pond has led to further sampling investigations by the DES Biology Section, site inspections by the New Hampshire Department of Agriculture, and the implementation of management practices to improve water quality.

In mid-July 2002, routine VLAP sampling revealed an abnormally high bacteria (*E.coli*) concentration in a stream that



Pine River Pond, Wakefield

flows into Pine River Pond. This alerted the volunteer monitors, the VLAP Coordinator, and the Limnology Center Director that there might be a problem upstream that could affect the lake. A group of VLAP monitors volunteered to start an investigation to determine what might be causing the high *E.coli* concentration in the stream. In late-July, the volunteer monitors took *E.coli* samples along the stream using the bracketing technique to better pinpoint the potential sources of elevated *E.coli*. Specifically, samples were taken upstream and downstream of at least two small farms where livestock was observed in close proximity to the stream.

The results from the late-July round of sampling indicated elevated *E.coli* levels in a few locations along the stream; however, the results were not conclusive. Since it appeared that

livestock might be contributing to the elevated *E.coli* levels in the stream, the Limnology Center Director referred a complaint to the New Hampshire Department of Agriculture.

In mid-August, a Department of Agriculture inspector met with one of the Pine River Pond volunteer monitors to investigate the stream. Specifically, at least two properties along the stream where livestock were in close proximity to the stream were inspected. The law, under RSA 431:33-35, requires that the Department of Agriculture make an inspection of such a property when a complaint is filed in order to determine if best management practices (BMPs) are being utilized on the property, and, when necessary, to make recommendations for the implementation of BMPs. (BMPs in this case help to achieve the beneficial use of animal waste and its nutrients while minimizing its possible impact to land, water and humans.)

During the site inspections, the Agricultural inspector met with the landowners and made verbal recommendations for better managing manure and livestock

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Connor's Corner



by Jody Connor
DES Limnology Center
Director

I want to welcome all and veteran volunteers to our 19th season of lake monitoring. In addition, I would like to extend my sincere thanks for your dedication to the protection of the quality of New Hampshire's lakes! Both Andrea and I admire the strong commitment you have for this important program and we appreciate the relationships we have formed with each of you. As many of you know, without your help it would be an impossible task to keep tabs on the 950 lakes located throughout the state. The data you generate not only helps biologists assess the health of the state's lakes but also helps us cooperatively make important decisions on how to manage and protect these lakes.

VLAP Updates

If you are a veteran monitor, you know that VLAP is constantly evolving and the program coordinators are always striving for improvement. Our latest improvements include the addition of important definitions (limno lingo) within the margins of the annual report, the addition of statistical analyses, and the development and implementation of a Quality Assurance Project Plan (more affectionately referred to as QAPP). Each of these improvements strengthens the current program and ensures that the data generated by the program is understandable, useful, and can be relied upon in

lake management decisions. Each of these improvements is explained in greater detail in the 2002 VLAP Annual Report.

DES Nutrient Criteria Update

During the last several years, the New England states and the U.S. Environmental Protection Agency have been working together to formulate a plan for nutrient criteria in surface waters. Most states currently have subjective narrative criteria for nutrients that have no real numbers that can be enforced as water quality standards. For example, New Hampshire's criteria state that "Class B waters shall contain no phosphorus in such concentrations that would impair any usage assigned to the specific class involved, unless naturally occurring".

DES will soon publish a policy that translates existing narrative criteria into numeric limits by waterbody type. Instead of using a phosphorus concentration, DES will use numeric limits based on a chlorophyll concentration. Specifically, since there is a strong relationship between the growth of surface algal scums, nuisance aquatic plant growth, and excessive chlorophyll concentration, DES has proposed a chlorophyll standard of 25 parts per billion (ppb). To better define this criteria, DES intends to use VLAP data to help statistically evaluate these relationships!

What to Expect this Season

Water quality and weather patterns have a strong relationship with one another. The 2002-03 winter was harsh, with record low temperatures and extensive snow and ice accumulations throughout the state. Due to the thick cover of ice and snow on many of the lakes, sunlight has not been able to penetrate

into the water column to support photosynthesis (the production of oxygen) for many months. This spring, DES has documented that several smaller ponds have gone anoxic (without oxygen), which has resulted in severe fish kills and odor problems.

Due to the thick ice cover on many lakes, water temperatures will be cooler and open water will occur later in the spring. This will cause the spring lake mixing and the annual spring diatom bloom to occur later than normal. Therefore, expect more turbid waters and lower transparency in May and early June.

I anticipate that the large amount of surface runoff from snow and ice melt and rains this spring will generate a great deal of phosphorus loading from the watershed into the lakes. Nearshore littoral zones (the area where rooted plants grow) will be less exposed due to higher water levels. Aquatic plant growth may start later than usual this spring, as sunlight penetration will be limited and water temperatures will be cooler. The increased area of the littoral zones will likely decrease competition for spawning grounds and the cooler water temperatures will provide a less stressful spawning experience that relates to less fish mortality.

Larger populations of green and golden-brown algae may occur in July, and I expect that cyanobacteria blooms will occur in some phosphorus rich lakes by August. Although New Hampshire lakes typically receive their share of filamentous green algae growth, cooler water may decrease the filamentous populations.

Connor's Corner cont'd on page 15

NH Lake Assessments and Impaired Waters - 2002 Summary

by Bob Estabrook, DES Chief Aquatic Biologist



The federal Clean Water Act (CWA) requires that states, territories, and jurisdictions submit two surface water quality documents to the U.S. Environmental Protection Agency (EPA) every two years to report on surface water quality and to list any impaired waters. Because of the section in the CWA that lists these requirements, the assessments are referred to as the 305(b) water quality report and the 303(d) list of impaired waters. EPA then summarizes the findings in a national water quality inventory (NWQI). *(Please see page 9 for the 2000 NWQI Summary.)*

How Do States & Other Jurisdictions Assess Water Quality?

To assess surface water quality, states and other jurisdictions compare their monitoring results to the water quality standards they have set for their waters. Water quality standards have three elements: the designated uses assigned to the waters, such as drinking, swimming, or fishing; criteria to protect uses, such as chemical specific thresholds that should not be exceeded; and an antidegradation policy intended to keep waters that do meet standards

from deteriorating from their current condition.

After setting water quality standards, states assess their waters to determine the degree to which the standards are being met. Procedures for making assessments vary widely from state to state. States may take biological, chemical, and physical measures of their waters; sample fish tissue and sediments; and evaluate land use data, predictive models, and surveys.

How Does DES Assess the State's Waters?

In 2002, the New Hampshire Department of Environmental Services (DES) produced a Consolidated Assessment and Listing Methodology (CALM) document that describes in detail the procedures used to assess the state's waters. It provides a statistical basis to decision making and directly relates designated use support to specific water quality criteria. The document is comprehensive and detailed, and somewhat complicated because all possible scenarios needed to be addressed. The assessment procedures and results for lakes are generalized

in this article. If you are interested in learning more about the details, the CALM document and assessment results, including results for individual lakes, can be found at www.des.state.nh.us/wmb/swqa.

In general, 10 samples within a 10-year period are required to make a water quality assessment for lakes in NH. If a water quality criterion related to a designated use is exceeded on three occasions, the designated use is not supported and the water is listed as 'impaired' (also called 'not support'). The major exception to the 10-sample requirement is bacteria where an assessment can be made on as few as two samples.

What are the 2002 Assessment Results for New Hampshire's Waters?

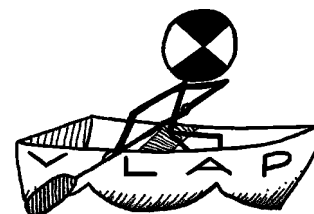
The major designated uses for lakes and the results for the 2002 assessment are summarized on page 8. (Please note that results reported in this article are in terms of numbers of lakes, whereas the official document reports results in terms of acres of lakes.)

NH Lake Assessments
cont'd on page 8

ATTEND THE ANNUAL VOLUNTEER LAKE ASSESSMENT PROGRAM WORKSHOP!

The 2003 VLAP Annual Refresher Workshop will be held on Saturday, May 17 at DES in Concord. We strongly encourage that at least one monitor from each monitoring group attend the workshop. Workshop participants will learn about the latest legislative and program updates, volunteer recruitment techniques, aquatic plant identification, and principles of lake ecology and sampling.

If you have not yet received information about this workshop and would like to attend, please contact Andrea LaMoreaux, VLAP Coordinator, at (603) 271-2658 or at vlap@des.state.nh.us.



Legislative Updates

by Jody Connor, DES Limnology Center Director



There is at least one significant piece of legislation that passed last year that will give New Hampshire lake enthusiasts something to cheer about! Exotic aquatic plants have been the scourge of New Hampshire lakes and the hot topic at any lake association meeting. Throughout the state, these weeds have lived up to their notorious reputation. Invasive exotic aquatic plants create navigational barriers for marinas, affect recreational activities, decrease water quality, and can significantly reduce property values.

Because of new legislation that became effective on January 1, 2003, help is on the way! Funding is now available to nonprofit organizations, municipalities, and state governmental agencies that will help prevent the spread of exotic aquatic plants, both within lakes and from lake-to-lake. The source of the funding will be an additional \$3 fee from boat registrations that will fund milfoil prevention and research grants. Approximately \$165,000 will be distributed to lake associations throughout the state to operate "Lake Host Programs." This successful program, which was piloted by New Hampshire Lake Association

(NHLA), DES, the Lake Sunapee Protective Association, and the Squam Lake Association during the summer 2002, helped to prevent the infestation of exotic plants to several lakes.

The NHLA was recently awarded funding through DES's Exotic Aquatic Plant Prevention Grants Program. All lake associations are encouraged to apply for funding to start their own Lake Host Program or begin similar innovative programs that prevent the spread of exotic plants. To apply, please refer to the Lake Host Program article on page 7.

Two exotic aquatic plant bills were submitted for legislation for the 2003 session. Senate Bill 159 would require all motorized vessels operating on New Hampshire public waters to display a water access permit. The cost of the permit will be \$13 when purchased from the state and \$15 if purchased at a business. There will be no increase of fees if the boat is registered in New Hampshire, as the permit cost is offset by a reduction in the registration fee. This will result in a new fee for boaters who have purchased a boat registration from another state. DES supports this legislation because the water access permitting sys-

tem will serve as a point of contact with out-of-state boaters for educational purposes concerning safety and environmental laws, will help the state determine the number of out-of-state boats for resource planning, and will provide additional revenue to augment marine safety, public access, and environmental protection programs.

Senate Bill 159 passed the Senate Environment Committee and the full Senate and will be passed onto the House Resource Recreation and Development Committee by the time you receive this newsletter.

Another milfoil-related bill is HB 329. This bill would establish a pilot program to introduce grass carp into Flints Pond in Hollis for the purpose of controlling milfoil. Although the grass carp has shown promise in controlling exotic aquatic plants, there are also a few drawbacks in using this management technique. Grass carp typically eat all plants and may create other water quality problems. This bill was retained in the Fish and Wildlife Committee and may be put into a study committee.

For more information, contact Jody Connor, Limnology Center Director, at (603) 271-2658 or jconnor@des.state.nh.us.

THE INTERACTIVE LAKE ECOLOGY CURRICULUM HAS BEEN UPDATED!



The ILE student and teachers' workbooks were revised last summer and are now available for purchase. The revised curriculum includes two new chapters, vocabulary exercises, and some new experiments and activities.

The student workbook costs \$5.50, while the teachers' reference is \$7.50. For information, contact Alicia Carlson at (603) 271-0698, or check out the website at www.des.state.nh.us/wmb/ILE.

Please help us spread the word about this exciting educational opportunity. You may even want to consider donating workbooks to a local middle school!

Exotic Aquatic Plants - Still a Growing Problem

by Amy Smagula, DES Exotic Species Program Coordinator

During the summer of 2002, four more lakes were added to the list of infested waterbodies in New Hampshire. Melendy Pond and Potanipo Lake, both in Brookline, Balch Lake in Wakefield, and Jones Pond Dam in New Durham each fell victim to variable milfoil infestations.

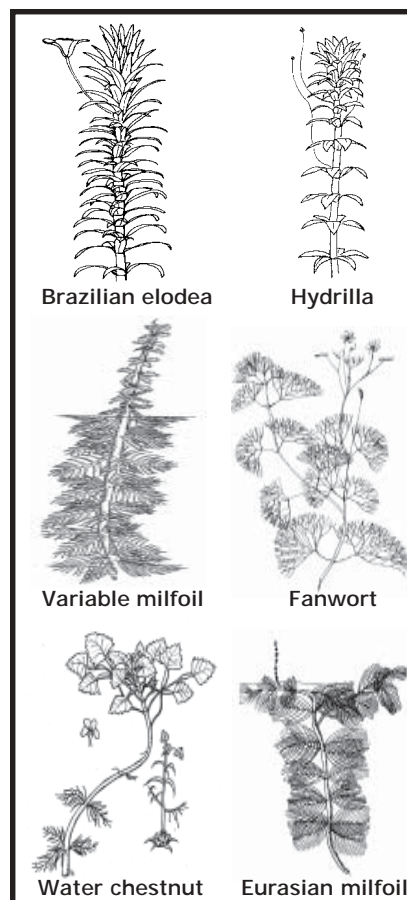
The infestations in all four waterbodies were suspected in 2001, but were not verified until the 2002 season. Herbicide applications for each of these waterbodies is planned for early spring of 2003 to try to reduce the plant biomass to manageable levels that could possibly be managed further by selective hand-pulling and bottom barriers.

Unfortunately, milfoil is no longer the only species to worry about. Hydrilla and Brazilian elodea, two similar looking plants, are beginning to spread throughout the northeast region of the U.S. New Hampshire already has one confirmed Brazilian elodea infestation in Nutts Pond in Manchester, and another suspected infestation in

Occum Pond in Hanover, which will be investigated by DES biologists this spring.

Hydrilla, though not yet found in New Hampshire, has crept its way into Long Pond in Barnstable, Mass., and was just identified during the fall of 2002 in Pickerel Pond in Limerick, Maine. Both of these plants are capable of out-competing milfoil, a feat that, to many, may sound impossible. While milfoil grows up to 15 or 16 feet long, in southern climates, Hydrilla and Brazilian elodea have been documented to reach 25 feet in length!

Lake residents are strongly encouraged to monitor their waterbodies and contact the Exotic Species Coordinator immediately at (603) 271-2248 or at asmagula@des.state.nh.us if they believe they have suspicious plant growths in their lake or pond. In most cases, volunteers will be asked to carefully collect a specimen of the plant and mail or deliver it to DES for identification. Biologists will respond immediately if the plant looks suspicious.



Invasive species of concern for NH

You can make a difference! Early detection is the key to preventing large-scale infestations. Check out the DES website for more information about exotic plants at www.des.state.nh.us/wmb/exoticspecies.

PARTICIPATE IN THE 2003 GREAT NORTH AMERICAN SECCHI DIP-IN!

We want to thank those of you who participated in the 2002 Great North American Secchi Dip-In. Approximately 3,000 monitoring groups from 41 U.S. states, six Canadian provinces, as well as Australia and Great Britain participated in the 2002 Dip-In!

While the final 2002 results are still being tabulated, we are now able to report on the 2001 results. The 2001 results show that New Hampshire ranked third in the nation with an average Secchi disk depth of 5.88



meters! Montana ranked second (6.49 meters), and Oregon ranked first at 15.71 meters. (Waldo Lake in Oregon had a secchi disk reading of 41 meters!) We are certain that New Hampshire will rank among the highest transparencies in the nation for 2002 as well.

The 2003 Secchi Dip-In will be held between June 28 and July 13. Please help us let the nation and the world know how clear New Hampshire's lakes and ponds are by participating in the 2003 Dip-In! Call now to reserve your Secchi disk!

For more information about the Dip-In, or to reserve a Secchi-Disk, please contact Jody Connor, the Limnology Center Director, at (603) 271-3414, or Andrea LaMoreaux, the VLAP Coordinator, at (603) 271-2658 or at vlap@des.state.nh.us.

Snakeheads: The Newest Aquatic Invader

based on US Fish & Wildlife Service Fact Sheet - July 2002



USGS Drawing – *Channa argus*

Recently, a non-native air-breathing freshwater fish known as a snakehead has generated national media attention as the latest invasive species to threaten native fish and wildlife resources. Snakeheads are divided into two distinct genera: *Channa* (snakeheads of Asia, Malaysia and Indonesia), and *Parachanna* (snakeheads of Africa).

Snakeheads look very similar to the North American native Bowfin. Within two genera, 28 separate species are recognized; however, due to similar physical characteristics, these species are difficult to differentiate.

Overall, these fish are long and cylindrical with enlarged scales on their head, hence the common name of snakehead. They have a large mouth with a protruding lower jaw that typically contains canine-like teeth. Their coloration and size vary, with the largest one recorded being four feet in length.

Where Are They From?

As a family, snakeheads have a native range that includes parts of Asia and Africa. However, fisheries scientists have found four species in seven states: California, Florida, Hawaii, Maine, Massachusetts, Maryland and Rhode Island. Reproducing populations have been documented in Florida and Maryland.

Experts agree that the various species most likely came into the U.S. from two different pathways. Due to the presence of

specific species, experts believe that some entered U.S. waters via releases by aquarium owners, and some via the live food fish trade by individuals releasing these fish to establish a local food source.

What are Potential Impacts to Our Native Ecosystems?

At all of their life stages, snakeheads will compete with native species for food. As juveniles, the food they seek includes zooplankton, insect larvae, small crustaceans and the fry of other fishes. As adults, these fish become voracious predators, feeding upon other fishes, crustaceans, frogs, smaller reptiles, and sometimes birds and mammals.

If snakeheads become established in North American ecosystems, their predatory behavior could drastically modify the array of native species. As a result, they could disrupt the ecological balance and forever change aquatic ecosystems.

In addition to their threat of predatory behavior and its resulting impacts, there is concern about snakeheads' transference of pathogens to native fish. Snakeheads carry a disease known as Epizootic Ulcerative Syndrome. Fisheries scientists need to study this disease to determine if it can be transferred to North American species.

Why Should We Care About Snakeheads?

The three biggest concerns regarding snakeheads are:

- 1) These fish are very predatory and could alter the balance of our ecosystems.
- 2) These fish are air-breathers and are capable of overland migration.
- 3) These fish are very aggressive in their efforts to protect their young.

When these factors are combined, snakeheads pose a significant threat to native fish and wildlife resources.

Amy Smagula, DES Exotic Species Program Coordinator, is concerned about the potential impact snakeheads could have on New Hampshire lake and pond ecosystems. "To date, the snakehead fish has not been documented in any of New Hampshire waterbody. Like with any exotic species, we should never consider ourselves 'safe' because it has not been found in our waters yet. Documented findings are just next door, in Maine and in Massachusetts. As we share border waters with both of these states, it is likely that if the snakehead furthers its spread, New Hampshire could be faced with the problems posed by this insidious fish."

What is Being Done About Snakeheads?

Since the recent discovery of snakeheads in a Maryland pond, the Fish and Wildlife Service (FWS) is working with that state's Department of Natural Resources to support them in trying to eradicate these fish. Also, the FWS worked

Snakeheads cont'd on page 7

The Lake Host Program - A New Checkpoint on Our Lakes

by Amy Smagula, DES Exotic Species Program Coordinator



During the summer of 2002, the New Hampshire Lakes Association (NHLA), with assistance from the Department of Environmental Services (DES), implemented New Hampshire's first Lake Host Program. The program was established through a federal grant from the National Oceanic and Atmospheric Administration that was obtained with the assistance of Senator Judd Gregg. Roughly \$92,000 of the overall grant was used to establish this program.

The objective of the Lake Host Program is to establish a first line of defense against new exotic aquatic plant infestations in our state's waterbodies. Paid inspectors (usually college students and lake residents) staff lake access sites and provide quick and complimentary inspections of boats, trailers and other aquatic recreational gear to ensure that no aquatic plant is introduced into the monitored waterbodies. Additionally, the

inspector provides written plant education materials to visiting boaters and asks a few questions to allow NHLA and DES to track usage of the state's waterbodies. Access sites are staffed during high use times, such as weekends and holidays.

NHLA and DES, as well as the Lake Sunapee Protective Association and the Squam Lakes Association, offered several training courses at the beginning of the summer to train each Lake Host inspector on the important things they should know, including plant identification, inspection protocols, tips on interacting with boaters, and what to do if a plant is found on a boat, trailer, or equipment. After the three-hour training course, Lake Host inspectors were ready to staff access sites to disseminate information and check each boat and trailer as it entered and as it left a waterbody.

The program was an immediate success throughout the state! Specimens of exotic aquatic plants, including variable milfoil and Eurasian water milfoil, were removed from boat trailers about to launch at five uninfested lakes. If the Lake Host inspectors were not there to spot and remove the plants, we could have had an additional five new infestations to worry about for the upcoming year!

The Lake Host Program was implemented on 37 waterbodies located throughout the state during the summer of 2002. Through new state funding and through the Milfoil and Other Aquatic Plant Prevention Grants we hope that the program will expand to other lakes during 2003.

For information about the Lake Host Program, please contact Nancy Christie, NHLA President, at (603) 226-0299 or nchristie@nhlakes.org.

Snakeheads cont'd from page 6

collaboratively with the Biological Resources Division of the U.S. Geological Survey to conduct a risk assessment for snakeheads. This analysis has provided the basis for the FWS to evaluate snakeheads as potentially injurious fish.

Under the authority of the Injurious Wildlife Provisions of the Lacey Act, the FWS listed the snakehead family as injurious. This action prohibits the importation and interstate transport of 28 snakehead species. After conducting an exhaustive analysis of the best information, the FWS has deemed that this ac-

tion was necessary to protect the interests of wildlife and wildlife resources from the purposeful or the accidental introduction of snakehead species into the ecosystems of the United States.

What are the Negative Impacts of this Action?

As part of the research conducted by the U.S. Geological Survey and the FWS, a cost-benefit analysis was included. The best available data show that there is a tradeoff between damage avoided by not letting snakeheads into the U.S. and the economic benefits received by the specialized sectors that currently import these fish.

Data collected by the FWS indicate that \$85,000 worth of snakeheads were imported into the U.S. over a four-year period from 1997-2000. The potential damage that could be done by snakeheads if they become established in U.S. waters would likely be in the millions of dollars and would appear to significantly outweigh the benefits generated by the current market.

For more information contact the U.S. Fish & Wildlife Service at (703) 358-2148 or www.contaminants.fws.gov/Issues/InvasiveSpecies.cfm.

NH Lake Assessments cont'd from page 3

PRIMARY CONTACT RECREATION

Definition: Waters suitable for swimming or for other recreational uses that require or are likely to result in full body contact and/or incidental ingestion of water.

Results: Thirty-seven of 148 freshwater beaches were listed as 'impaired' because they were posted in the last two years because of bacteria exceedances. Three out of 760 assessed lakes were listed as 'impaired' because of high chlorophyll-a values (Dorrs and Nutt Ponds in Manchester, and Sebbins Pond, Bedford). No lakes (other than the public beaches) were impaired because of bacteria.

AQUATIC LIFE

Definition: Waters that provide suitable chemical and physical conditions for supporting a balanced, integrated and adaptive community of aquatic organisms.

Results: Although nearly half of New Hampshire's total lake area was listed as 'not supporting' for aquatic life, 90 percent of this was due to the 44 lakes with exotic plants, including 44,586 acre Lake Winnepesaukee. Ninety-one lakes were not supporting for pH, with 70 percent of them caused by acid rain and 30 percent due to natural conditions. Twenty-eight lakes were not supporting for aluminum and these were all lakes also impaired for pH. One lake (Maxwell Pond, Manchester) was 'not supporting' because of a violation of the instantaneous dissolved oxygen criteria.

FISH CONSUMPTION

Definition: Waters that support fish free from contamination at levels that pose a human health risk to consumers.

Results: All New Hampshire lakes are considered to 'not support' the fish consumption use because of the general state-wide fish consumption advisory due to mercury. This does not mean that freshwater fish cannot be consumed; advisory guidelines, however, should be followed.

DRINKING WATER SUPPLY

Definition: Waters that with conventional treatment will be suitable for human intake and meet state and federal drinking water regulations.

Results: Any lake used as a public drinking water source that was treated within the last two years with the algaecide copper sulfate to control taste and odor or filter-clogging algae was listed as 'not support' for this use. Four lakes were listed: Bowers and Harris Ponds in Nashua (Pennichuck Water Works), Rochester Reservoir, Rochester and Canobie Lake, Windham.

How Can Our Monitoring Group Help?

By monitoring your lake through VLAP, you are already helping DES assess the surface water quality in the state! For most water quality criterion for lakes, only VLAP lakes could be assessed for the 2002 report because these were the only lakes with sufficient data. However, there are few more ways that your monitoring group may be

able to help DES improve upon its ability to assess the quality of the state's lakes. These are:

1. Sample your lake at least three times each summer. An increase in VLAP data collection would enable DES to determine water quality trends and report on the quality of surface waters with more accuracy.
2. Consider sampling your lake for *E.coli*. While bacteria are not generally problematic in New Hampshire lakes, we recommend that each monitoring group take at least two shoreline *E.coli* samples each summer so that the lake can be assessed for swimming.
3. Please spread the word about VLAP! Invite other lake associations, community officials, and lake residents to join VLAP. An increase in the number of lakes participating in VLAP would further enable DES to determine water quality trends and report on the quality of surface waters throughout the state.

Regardless of an individual's or group's motivation for joining VLAP — whether it is to improve community planning decisions, to do their part in protecting the local environment, or to protect their own investment in property adjacent to a lake or pond — the end result is the same: VLAP volunteer monitors play an integral role in DES's mission to protect and report on the quality of New Hampshire's lakes!



"A lake is a landscape's most beautiful, expressive feature; it is Earth's eye, on looking into which the beholder measures the depth of his own nature."

Henry David Thoreau in Walden

EPA Reports 2000 National Water Quality Inventory Shows Little or No Change in Nation's Water Quality

by Robin Woods, U.S. EPA

On September 30, 2002, the U.S. Environmental Protection Agency (EPA) released its biennial national summary of water quality, based on water monitoring findings reported by the states, territories, jurisdictions and tribes in 2000 under Section 305(b) of the Clean Water Act. The information in the summary report applies only to the waters that were assessed for one or more of the uses, such as swimming, fishing, and fish consumption, designated for them by the states.

States assessed 19 percent of the nation's 3.7 million total river and stream miles, 43 percent of its 40.6 million acres of lakes, ponds and reservoirs, and 36 percent of its 87,300 estuary square miles for this report. EPA reports that 39 percent of assessed river and stream miles, 45 percent of assessed lake acres, and 51 percent of assessed estuary square miles in the nation were found to be impaired for one or more uses.

EPA found that the percentage of assessed river/stream and estuary waters found to be impaired has increased somewhat from the last report in 1998, although that difference is more likely due to changes in assessment approaches than actual water quality changes. Many



states are choosing to use higher quality data than in the past in making their assessments, discarding older or less quality-assured data. They are also moving toward more comprehensive examination of fish tissue and issuing statewide advisories limiting the consumption of certain species of fish. Mercury, which originates from air transport from power generating facilities and incinerators, mining, natural rock weathering and other sources, was cited in approximately 2,240 of the nation's 2,800 fish consumption advisories reported in 2000 and is reported as a leading cause of impairment in U.S. lakes and estuaries.

According to G. Tracy Mehan, EPA Assistant Administrator for Water, this report points out the need for more effective controls to address the nation's water quality problems, especially those originating from diffuse, non-permitted sources such as runoff from agricultural and urban areas, as well as air deposition. As in the past, these non-point sources continue to domi-

nate as sources of pollution. "EPA and the states need to work together as partners to solve this problem and implement more effective solutions," said Mehan.

EPA is working to improve identification and cleanup of impaired waters through the Clean Water Act Section 303(d) program. This program calls for participation of the public in the identification of impaired waters and in the development of pollution "budgets" used to restore the health of those waters. EPA is also developing a national monitoring strategy to improve water quality assessment and reporting and ensure that state water quality findings are comprehensive and comparable among states and over time. Under the Clean Water Act, states have primary responsibility for water quality monitoring.

The 2000 National Water Quality Inventory is the 13th in a series published since 1975. New EPA guidance issued in November 2001 calls for future reports to include information on impaired waters as reported by the states under Section 303(d) of the Clean Water Act.

The "National Water Quality Inventory: 2000 Report" is available at www.epa.gov/305b/2000report. Robin Woods can be reached at (202) 564-7841 or woods.robin@epa.gov.

NALMS IS RETURNING TO NEW ENGLAND!

The annual North American Lake Management Society (NALMS) [international symposium will be held in New England in 2003! NALMS is returning to its home waters to discuss protecting the legacy of the re-](#)

[gions' precious and constantly changing and challenged lakes.](#) Plan on attending the symposium which will be held November 5 - 8 at the Foxwoods Resort Casino in Mashantucket, Connecticut.



For more information, please visit the NALMS website at www.nalms.org.

Pine River Pond Cover Story cont'd from page 1

activities around the stream. Recommendations were made on keeping livestock away from the stream by prohibiting access, keeping manure out of the stream by periodic cleaning, and establishing a manure storage area located away from the stream, and minimizing the amount of stormwater runoff entering the stream by establishing vegetative buffers along the stream banks.

In addition, the Agricultural inspector gave each landowner information pertaining to the Agricultural Nutrient Grant Program, a program that could assist the landowners to comply with the BMP recommendations.

Subsequently, one of the investigated property owners applied for, and was later awarded, an Agricultural Nutrient Management grant to fence the livestock out of the stream.

In September and October of 2002, staff from the DES Biology Section sampled along the stream after two rainstorms in an effort to further pinpoint the sources of elevated *E.coli*. (Note: In order to better pinpoint sources of pollutants, it is helpful to collect samples in many locations along a stream after a major rainstorm since rain that washes over the surface of the land typically picks up pollutants before it flows into

a stream. This type of sampling is called "stormwater sampling.") The *E.coli* results for the two stormwater sampling events were very high in certain locations. This was likely due to the prior accumulation of manure in the soil along the stream banks and in the surrounding wetland systems.

The Department of Agriculture will send out an inspector in the spring of 2003 to ensure that the recommendations for both properties have been followed and that grant funds have been used as agreed to. In addition, during the 2003 VLAP sampling season, the DES Biology Section will continue to work with the Pine River Pond volunteer monitors to conduct stormwater sampling and bracket sampling along the stream to determine if elevated *E.coli* levels continue to persist.

The Pine River Pond *E.coli* investigation is just one example of many in which VLAP monitors have been invaluable to DES's mission to protect the quality of the state's lakes and ponds.

Thanks to the Pine River Pond volunteer monitors concern about the quality of the lake, another pollution threat to one of the state's precious lakes may have been thwarted!

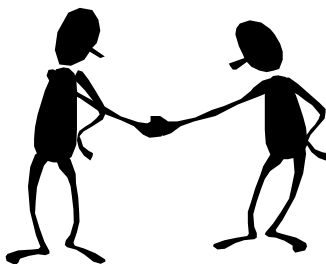
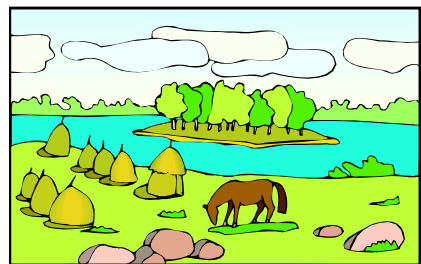
Making a difference can also involve volunteer monitors going the "next step" by joining the New Hampshire Clean Lakes Program. When a negative water

quality trend in a lake is revealed through VLAP monitoring, then the lake and its watershed may be eligible for more intensive study through the New Hampshire Clean Lakes Program. Through this program, diagnostic watershed studies have been conducted at Lake Wentworth (Wolfeboro), Partridge Lake (Littleton), Baboosic Lake (Amherst), Rust Pond (Wolfeboro), and Pleasant Lake (Deerfield). Recommendations are made to assist monitoring groups and communities in the preservation, enhancement, and rehabilitation of lakes. In addition, diagnostic studies have helped monitoring groups secure funding to implement recommendations and to "fix" the watershed problems.

If you would like to investigate a water quality problem in your watershed, contact Andrea LaMoreaux at (603) 271-2658 or at vlap@des.state.nh.us.

To find out more about stormwater sampling, refer to the special topic in your 2002 Annual VLAP report or visit the VLAP website at www.des.state.nh.us/wmb/vlap.

To find out more about the Clean Lakes Program, contact Amy Smagula at (603) 271-2248 or at asmagula@des.state.nh.us.



"Never doubt that a small group of thoughtful, committed citizens can change the world.

Indeed, it's the only thing that ever has."

Margaret Meade

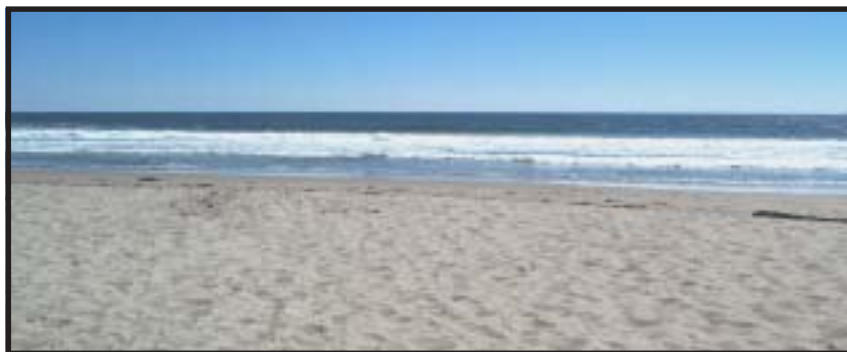
The NHDES Beach Program

by Sara Sumner, DES Beach Program Coordinator

The New Hampshire Department of Environmental Services (DES) Beach Program has monitored public beaches throughout the state for over 20 years. The program's main goal is to protect the public from contracting water-borne illnesses while recreating at public bathing beaches. Waterborne illnesses such as gastroenteritis, which can cause nausea, fever, vomiting, and diarrhea, pose serious threats to public health. Human and animal wastes are the main sources contributing to the presence of bacteria at beach areas.

DES works diligently during the swim season to ensure that public beaches are monitored on a consistent basis for the presence of illness or disease causing organisms. Freshwater beaches are monitored for the presence of *E. coli*, while coastal beaches are monitored for the presence of Enterococci (a bacteria that survives longer in saline environments). Freshwater beaches are monitored on a monthly basis from mid-June through Labor Day and coastal beaches are monitored on a weekly or bi-weekly basis during the same period.

DES is currently enhancing its coastal and freshwater beach programs. The U.S. Environmental Protection Agency (EPA) recently established the Beaches Environmental and Coastal Health Act (BEACH). The BEACH act provides funding for coastal and Great Lakes states to develop, implement, and expand current coastal beach sampling programs. With this funding, DES will increase



and enhance its monitoring efforts on the coast during the 2003 season to include Microbial Source Tracking (MST) techniques and wet-weather monitoring. DES has enhanced its public notification process to include new signage, a Beach Program webpage on the DES website and coverage on the Earth 911 website. DES has also adopted a Beach Advisory for the presence of cyanobacteria (blue-green algae) scums at public beaches.

During the 2002 sampling season, 13 coastal beaches were sampled on a routine basis (increase from nine), while 163 freshwater beaches were sampled on a routine basis. No beach advisories were posted at any of the coastal beaches, while 21 advisories were posted at freshwater beaches for bacteria exceedances. Two beach advisories were posted at freshwater beaches for toxic cyanobacteria scums.

To learn of current beach advisories you can access the DES website at www.des.state.nh.us, or for coastal beach advisories logon to Earth 911 at www.earth911.org/waterquality/index.asp. Also, look for Beach Advisory signs posted at access

points to the beach area. Yellow signs indicate that bacteria levels exceeded state standards; red signs indicate the presence of a toxic cyanobacteria scum. If you are at the coast, look for green "Open" signs, which indicate that the beach is routinely monitored by DES; and look for orange "Not Monitored" signs, which indicate that the beach is not monitored on a routine basis by DES.

WE NEED YOUR HELP!

The DES Beach Program is hoping to develop an Adopt-a-Beach Program. We are looking for motivated volunteers to adopt beaches on their lakes or ponds to sample during the swim season. The data volunteers collect would be used for tracking water quality at beaches, posting beach advisories, and annual reporting to EPA.

For additional information, or if you are interested in volunteering for an Adopt-a-Beach Program, contact Sara Sumner, Program Coordinator, at (603) 271-8803 or ssumner@des.state.nh.us; Jody Connor, Limnology Center Director, at (603) 271-3414 or jconnor@des.state.nh.us; or Alicia Carlson, Program Assistant, at (603) 271-0698 or acarlson@des.state.nh.us.

The DES Mobile Pumpout Boat: The Successful First Year

by Alicia Carlson, DES CVA Program Assistant

Untreated boat sewage can affect water quality in a variety of ways. It not only contains nutrients, which we all know can cause algae blooms, but it also contains bacteria, which may cause diseases.

So, what is the Department of Environmental Services (DES) doing to combat these pathogens and nutrients? The DES Clean Vessel Act (CVA) program supplies marinas with funds to install boat sewage pumpout facilities at their docks. While this is usually an effective approach, some boaters find it difficult to search out these facilities, especially if they are just passing through New Hampshire's coastal waters.

To minimize this problem, DES purchased a mobile pumpout boat that could be used to service moored, transient, and docked boats for a small fee. The program sought out a company to operate the boat at the coast, and eventually joined forces with Portsmouth Harbor Towing.

Kenny Anderson, an employee of Portsmouth Harbor Towing, was chosen as the mobile pumpout boat captain. His outgoing attitude and professional work ethics helped make the first year of the service successful. The boat provided its first pumpout service in June 2002. Between June and November 2002, Kenny and the pumpout boat removed boat sewage from more than 200 boats, for a total of more than 2,000 gallons of sewage!

The mobile pumpout boat can help keep New Hampshire's coastal waters free from pathogenic organisms and nutrients that can negatively impact our bathing beaches and shellfish beds. For information about this program, please contact Alicia Carlson at (603) 271-0698 or at acarlson@des.state.nh.us, or visit the CVA website at www.des.state.nh.us/wmb/cva/.



LAKE TRIVIA: STUMP YOUR FELLOW LAKE ENTHUSIASTS!

Question: Who Was Secchi?

Father Pietro Angelo Secchi, scientific advisor to the Pope, was asked by Commander Cialdi, head of the Papal Navy, to test a new transparency instrument. This instrument, now named the "Secchi disk" (rhymes with "becky") was first lowered from the papal steam yacht, l'Immacolata Concezione (The Immaculate Conception) in the Mediterranean Sea on April 20, 1865.

Secchi (1818-1878) was actually a famous astronomer, one of the first astrophysicists. A pioneer in the application of photography to astronomy, he photographed an eclipse of the sun in 1851.



Father Pietro Angelo Secchi

What are the five largest lakes in N.H. with respect to surface area?

1. Lake Winnepesaukee (44,585 acres)
2. Lake Umbagog (7,850 acres)
3. Squam Lake (6,764 acres)
4. Lake Winnisquam (4,264 acres)
5. Newfound Lake (4,105 acres)

What are the five deepest lakes in N.H.?

1. Newfound Lake (182.0 ft)
2. Lake Winnepesaukee (180.1 ft)
3. Lake Winnisquam (173.8 ft)
4. Silver Lake, Madison (164.0 ft)
5. First Connecticut Lake (163.0 ft)

What five lakes in N.H. have the longest shorelines (including shorelines of islands greater than 5 acres in size)?

1. Lake Winnepesaukee (386,200 meters)
2. Squam Lake (97,400 meters)
3. Lake Umbagog (69,500 meters)
4. Moore Reservoir (49,600 meters)
5. Lake Sunapee (47,600 meters)

What N.H. lake is located at the highest elevation?

Lake of the Clouds, Mt. Washington (5,050 ft. above mean sea level)

VLAP Lakes Receive Grant Funds

by Andy Chapman, DES Biology Section Watershed Protection Specialist

The New Hampshire Department of Environmental Services continues to administer two grant programs that are available to municipalities, regional planning agencies, non-profit organizations, and conservation districts to address watershed management issues. The Nonpoint Source Local Watershed Initiative and Watershed Restoration grant programs can be used to address several aspects of watershed management including education and outreach programs, organization building, watershed planning and assessment, and implementation, including the installation of structural and non-structural measures that protect water quality and quantity.

Here is a summary of a few of the DES grant funded watershed management projects that VLAP organizations are currently involved with:

Lake Winnisquam, Meredith

In 2001, The Town of Meredith was awarded a Local Watershed Initiative Grant for the Batchelder Hill Road Drainage Improvements Project. The Town, in cooperation with Natural Resource Conservation Service (NRCS), engineered a design to reduce the sedimentation, turbidity and phosphorus levels of stormwater run-off from Batchelder Hill Road, which discharges directly into Lake Winnisquam. The design, which incorporates roadway paving, drainage swales, check dams, catch basins, and a plunge pool, was completed in June 2002. The Town's Road Crew completed the construction by late-summer 2002. Additional water quality sampling

will be conducted in the spring of 2003 to monitor the success of the project.

Chalk Pond, Newbury

In 2001, the Town of Newbury received a watershed grant to address sedimentation into Chalk Pond caused by road drainage. This grant included a Sunapee Hills Association (SHA) educational and outreach component. During 2001, the SHA compiled the design specifications for each septic system in the watershed, and mailed this information and a general septic system fact sheet to each homeowner. SHA mailed phosphorus and aquatic plant educational material to each homeowner. In addition, an informational kiosk was built at the Association's beach.



Information kiosk at Chalk Pond

During the fall of 2001, the Town Road Agent and crew began installing drainage improvements for the Skytop Drive drainage area. Improvements designed to greatly reduce sedimentation and stormwater runoff from the road into the pond were successfully completed by September 2002. Runoff was directed through several BMPs (including vegetated and rip-rapped drainage swales, a level spreader and a sedimentation basin) before emptying into a forested wetland adjacent to the outlet from the pond. In 2003, the Associa-

tion will continue educational efforts with a newsletter and the installation of an informational display at the Association's recreation hall.

French Pond, Henniker

In 2001, the Henniker Conservation Commission received a grant to quantify the phosphorus loading of the tributaries leading to French Pond. In 2001, the Conservation Commission and French Pond Association (FPA) collected samples on a bi-monthly basis from eight tributary stations, as well as the deep spot. Stormevent samples were also collected in 2001 and 2002. In addition, the FPA conducted a survey to document the status of residential septic systems for homes located near French Pond.

Elevated phosphorus levels in stormevent samples reinvigorated a collaborative effort to implement BMPs at a farm within the French Pond watershed. The N.H. Department of Agriculture, DES, and the NRCS worked with the landowner to develop a conservation plan for the farm. In the fall of 2002, pigs were fenced out of areas near Cow Brook. With NRCS assistance, site work for a manure pit was completed and is ready for construction. By containing the manure in an area where it will not be washed into the brook during stormevents, the manure pit will greatly reduce phosphorus loadings to Cow Brook.

Grant funds may be able to protect the quality of your lake. For more information, visit the DES web site at www.des.state.nh.us/wmb/was/grants.htm or contact Andy Chapman at (603) 271-5334 or achapman@des.state.nh.us.

Sampling Tip: The Integrated Tube Sampler

by Andrea LaMoreaux, DES VLAP Coordinator

There are two approved ways that VLAP monitors can collect chlorophyll-a samples: the composite method and the integrated tube sampler method.

Using the composite method, the Kemmerer bottle is used to collect water at each meter from the middle of the metalimnion (lakes with three thermal layers) or two-thirds of the depth (lakes with one or two thermal layers) up to the surface of the lake. At each meter, an equal amount of sample water is collected and then dumped into a bucket. After the sample water has been collected at each meter, the bucket is mixed and then the chlorophyll-a bottle is filled.

Using the integrated tube sampler method, the weighted end of a tube is connected to a calibrated chain and then the tube and the chain are lowered from the surface down to the middle of the metalimnion in stratified lakes or two-thirds of the depth in unstratified lakes. The tube is crimped at the water surface and then the weighted end is hauled up by the chain to the surface. The weighted end of the tube is placed in a bucket and then the crimped end is uncrimped, which causes the sample water to flow into the bucket. The chlorophyll-a bottle is then filled with the integrated sample water.

If the depth from which your monitoring group takes the chlorophyll-a sample is four meters or greater, we suggest that you use the integrated tube sampler method. The amount of time involved using this method to collect the chloro-

phyll-a sample from four meters or greater will be much less than would be involved using the composite method. (Please note that the integrated tube sampler method is not appropriate for lakes where the chlorophyll-a sample is taken from less than four meters because the amount of sample water collected in the tube may not be adequate to fill up the chlorophyll bottle.)

While the DES Limnology Center has a couple of integrated tube samplers to loan out, we recommend that monitoring groups make their own integrated tube sampler. It is relatively easy to make, just follow these simple instructions:

Materials:

- Tygon tubing or garden hose (1" diameter)
- Plastic bottle (Nalgene 1L)
- Eyebolt, nut and two washers
- Weight material (cement/sand/gravel)
- Strong glue (epoxy)
- Small hose clamps

Instructions:

1. Cut the tubing or garden hose (recommended diameter of 1") to desired length (the tubing length should exceed the sampling depth by at least one meter). Mark the tube at each half-meter with a permanent pen.
2. Using a drill, very carefully cut a hole slightly smaller than the tube in the cap and bottom of a 1-Liter large-mouth Nalgene bottle.
3. Place the cap on the tube, followed by the hose clamps positioned about four to six inches from end of tube. Tighten the clips so that they will not slip.



Integrated Tube Sampler

4. Place the bottle so that approximately one inch of tube protrudes through the bottom of the bottle. Slide the cap up the tube such that the bottle is open.
5. Screw and secure the eyehook into bottle, using a nut and washers. (You may need to drill a small hole in the bottle first.)
6. Apply epoxy to seal hose to the bottom of the bottle.
7. Mix concrete according to instructions and pour in the bottle around the tube until bottle is filled to the bottom of the neck.
8. Slide cap in place and screw on tightly. Apply epoxy to seal hose and cover.
9. Allow sampler to dry for 24 hours before use.
10. When using for sample collection, fasten a calibrated chain or rope to the eye hook. Note: The chain or rope should be calibrated in half-meters.

If you have any questions, please contact the VLAP Coordinator at (603) 271-2658 or at vlap@des.state.nh.us. For instructions on how to use the integrated sampler, please consult the NHVLAP Monitor's Field Manual or ask the DES Biologist for a demonstration during the annual visit to your lake or pond this summer.

NEW HAMPSHIRE LAKES EXPLORED IN NEW BOOK

Here's a great way to wile away the hours between now and the sampling season. Pick up a copy of the terrific new book *POWER & PARADISE: The Double Lives of New Hampshire Lakes*, by Wilma Allen, and gain a new appreciation for our precious waterways.

"Starting with the Laurentide ice sheet of a dozen millennia ago and running clear through to the uncertain status of Pennichuck Water Works, this intriguing new book looks at New Hampshire history and geography through the unusual lens of its lakes," wrote David Brooks in a review for *The Telegraph*. "This approach produces some unexpected tidbits," he continued.

Such as: almost one-quarter of our lakes are man-made or artificially raised by dams ... Massachusetts industries once tried to monopolize water rights to all lakes that drained into the Merrimack River ... Lake Winnepesaukee's famous M/V Mount Washington was sliced like a breadloaf into 21 segments and shipped by rail to Laconia ... In the heyday of the ice industry, equipped with just hand saws and horse power, men hauled thousands of tons of ice annually from our lakes for shipment as far south as Cuba.

There's lots more than anecdotes about the lakes' dynamic and colorful past. *POWER & PARADISE* is loaded with illustrations, rare historic and up-to-date photographs. Plus, it describes the lakes' condition today, the many contributions lake associations and other groups make to protect their waters, and raises concerns for the future.

POWER & PARADISE: The Double Lives of New Hampshire Lakes is the fourth book published by Allen's company Double-U Books. It can be purchased or ordered at many bookstores and gift shops, or can be ordered directly from Double-U Books, PO Box 57, Rindge, N.H. 03461 (\$16.95 plus \$3.50 shipping and handling).

In addition to writing and publishing, Wilma Allen is a VLAP volunteer and president-elect of the Monomonac Lake Property Owner's Association in Rindge. Her inspiration for this book was the popularity of her 2001 history, "From Cotton to Cottages, The Evolution of Lake Monomonac." If you would like Wilma to speak at your lake association meeting or help with a history of your lake, community or organization, give her a call at (603) 899-5501.

Connor's Corner cont'd from page 2
Observe your lake closely for these changes and report any unusual sightings to the Biology Section (603-271-3414).

Other Volunteer Activities

If you have not joined our Weed Watchers Program yet, please sign up for this important program! Remember, early detection is key to saving a lake from an exotic aquatic plant infestation.

Also, DES continues to encourage each lake association to bring in fish for mercury analyses. If you have not submitted fish, or you would like to submit additional fish, please give us a call and we will let you know what species are desired and what procedures should be followed.

Happy Sampling!

I hope that you continue to learn more about our state's lakes and

DON'T PEE IN MY POND

by Marjorie Thorpe, VLAP Monitor
Lake Wicwas, Meredith

It's only a pond,
for heaven sake.
It's had all the punishment
that a pond can take.

It's bottom is mud
not concrete or tile.
What you put in it
stays for a while.

Fast boats stir it up
people throw things in.
The pond grows old
and no one wins.

With filters and chlorine
It's not like a pool.
It's home for many things
that really are cool.

We do what we can.
We clean and rake,
but nothing we do
removes nitrogen or phosphate.

These nutrients come from things
familiar to you and me.
Soaps, shampoo, fertilizers
and, of course, pee.

More nutrients, more weeds,
is a good rule of thumb.
Plus algae that will form
a layer of pond scum.

If it didn't come from the pond
please keep it out.
That is what good ecology
is all about.



that you have fun while conducting your sampling efforts this summer. Hopefully, by summer 2004 we will have moved into our new and larger Limnology Center and will be able to better serve your sampling needs.

Remember to call now if you would like a DES biologist to speak at your annual lake association meeting.

See you soon!

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